TETRA TECH EM INC.

August 10, 2006

Mr. Roy Crossland
START Project Officer
U.S. Environmental Protection Agency, Region 7
901 North 5th Street
Kansas City, Kansas 66101

Subject: Quality Assurance Project Plan
Removal Action at the United Zinc # 1 Site, Iola, Kansas
U.S. EPA Region 7 START 3, Contract No. EP-S7-06-01, Task Order No. 0043
Task Monitor: Eddie McGlasson, On-Scene Coordinator

Dear Mr. Crossland:

The Tetra Tech EM Inc., Superfund Technical Assessment and Response Team (START) is submitting the attached Quality Assurance Project Plan for a removal action at the United Zinc # 1 site in Iola, Kansas. If you have any questions or comments, please contact the project manager at (913) 908-4649.

Sincerely,

for David A. Zimmerman
Rick Claytor, CHMM
START Project Manager

Ted Faile, PG, CHMM
START Program Manager

Enclosure

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QUALITY ASSURANCE PROJECT PLAN FOR REMOVAL ACTION SUPPORT

UNITED ZINC # 1 SITE, IOLA, KANSAS

Superfund Technical Assessment and Response Team (START) 3
Contract No. EP-S7-06-01, Task Order No. 0043

Prepared For:

U.S. Environmental Protection Agency
Region 7
901 North 5th Street
Kansas City, Kansas 66101

August 10, 2006

Prepared By:

Tetra Tech EM Inc.
8030 Flint Street
Lenexa, Kansas 66214
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APPROVED BY:

Rick Claytor, CHMM, START Project Manager	8-10-06 Date
Ted Faile, PG, CHMM, START Program Manager	8-10-06 Date
Kathleen Homer, START Quality Assurance Manager	8-10-06 Date
Eddie McGlasson, EPA Project Manager, Superfund Division	Date
Diane Harris, EPA Region 7 Quality Assurance Coordinator	Date

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1.0 PROJECT MANAGEMENT

1.1 DISTRIBUTION LIST

Region 7 EPA	Eddie McGlasson, Project Manager Diane Harris, Quality Assurance Coordinator
Region 7 START	Rick Claytor, Project Manager Ted Faile, Program Manager Kathleen Homer, Quality Assurance Manager

1.2 PROJECT, TASK ORGANIZATION, AND SCOPE OF WORK

Rick Claytor, of Seagull Environmental Technologies, Inc., a team subcontractor to Tetra Tech EM Inc., (Tetra Tech) for the U.S. Environmental Protection Agency (EPA) Region 7 Superfund Technical Assessment and Response Team (START) 3 contract, will serve as the START Project Manager for EPA-funded, time-critical removal action activities described in this Quality Assurance Project Plan (QAPP) to be conducted at the United Zinc # 1 (UZ) site in Iola, Kansas. He will be responsible for ensuring implementation of field activities specified in the QAPP and providing periodic updates to the client concerning the status of the project, as needed. Eddie McGlasson will be the EPA Project Manager for this activity.

Two Tetra Tech START members will comprise the field sampling team. The team will be responsible for assistance to EPA with obtaining access to properties in the study area, acquisition and calibration of sampling and monitoring equipment, sample collection, field screening, documentation of residential property conditions and field activities, and coordination of laboratory analyses. The Tetra Tech START quality assurance (QA) manager will provide technical assistance, as needed, to ensure that necessary QA issues are adequately addressed.

Although an attempt will be made to adhere to this QAPP as much as possible, the proposed activities may be altered in the field if warranted by site-specific conditions and unforeseen hindrances that prevent any aspect of this QAPP from being implemented in a feasible manner. Such deviations will be recorded in the site logbook, as necessary. This QAPP will be available to the field team at all times during sampling activities to serve as a key reference for the proposed activities described herein.

1.3 PROBLEM DEFINITION, BACKGROUND, AND SITE DESCRIPTION

This QAPP was prepared by Tetra Tech START to address concern of imminent impact on human health and the environment at the UZ site, where soil contaminated with lead has been identified during previous sampling activities.

The site is located in the southeastern portion of Kansas. The former smelter site is currently a residential/commercial area on the east side of Iola, Kansas (see Appendix A, Figure 1). The study area encompasses a 1-mile radius around the former United Zinc # 1 property. The United Zinc # 1 former milling and smelting site covers approximately 17 acres, much of which is now vacant. Businesses currently at the site include: Brentagg Southwest, Inc., MFA, Superflea Flea Market, Tucker's Flea Market, and a portion of a concrete plant.

With the historical discovery of natural gas in the area, ample fuel became available to support numerous zinc and lead smelting operations in the region. From 1902 until 1912, the United Zinc and Chemical Company utilized the site for lead and zinc smelting and processing operations.

Under the Kansas Department of Health and Environment's (KDHE) State Water Plan (SWP) program, a Phase I Focused Former Smelter Assessment was completed at the United Zinc #1 site in December 2003. The assessment identified the site as a potential source of heavy metals contamination due to the historical activities at the site. In December 2004, a KDHE contractor conducted a Phase II assessment at the site and identified elevated concentrations of lead, cadmium, arsenic, and zinc on the former United Zinc and Chemical Company property. Concentrations of those metals were detected as high as 49,000 milligrams per kilogram (mg/kg) for lead, 380 mg/kg for cadmium, 1,800 mg/kg for arsenic, and 52,000 mg/kg for zinc. The assessment also identified the potential for elevated levels of lead on nearby residential, school, and daycare properties.

In June 2005, KDHE screened the right-of-ways of 50 residential properties around the United Zinc #1 site. Discrete surface soil samples were collected at each property and analyzed (using both field screening and laboratory methods) for lead, arsenic, cadmium, and zinc. The results of this investigation identified lead-contaminated soils (i.e., exceeding 400 mg/kg) at 36 percent of the properties. Relative concentrations of the other metals of concern typically mimicked the lead levels.

In September 2005, a Preliminary Removal Site Evaluation (RSE) was conducted by a KDHE contractor at sensitive receptor areas identified during previous investigations. This involved the collection of

discrete soil samples from the McKinley Elementary School and the Iola Preschool. Lead concentrations greater than 400 mg/kg were identified in soils on and adjacent to the McKinley Elementary School property; however, no elevated concentrations of metals were found in the samples collected from the Iola Preschool (Tetra Tech 2006).

Tetra Tech START conducted a RSE at the United Zinc #1 site in April and May 2006 that included field screening of surface soils for lead using an x-ray fluorescence (XRF) analyzer. During the RSE, XRF screening was conducted at 259 properties throughout Iola. Lead concentrations in soil were identified by XRF screening to be greater than the removal action level of 800 mg/kg at ten residential and two commercial properties. In addition, two school properties, seven daycare facilities, and one residence where a child with an elevated blood-lead (EBL) level lived had soils with lead concentrations greater than 400 mg/kg – the removal action level established for these types of properties. Also, eight additional properties were identified by laboratory analysis where lead concentrations exceeded the removal action level of 800 mg/kg (where XRF readings were below 800 mg/kg). Consequently, 30 properties were identified where XRF and/or laboratory data indicated lead concentrations warranted a time-critical removal action.

1.4 PROJECT AND TASK DESCRIPTION

The activities described in this QAPP will address the following:

- Comprehensive identification of the extent of soil contamination in the study area resulting from historical smelting activities.
- Determination of post-excavation concentrations of metals in site soils to determine whether removal goals have been achieved.
- Determination of appropriate disposal options for excavated soils.

Relevant aspects of the project are described in the following sections of this QAPP.

1.5 QUALITY OBJECTIVES AND CRITERIA FOR MEASUREMENT DATA

The QA objective for this project is to provide valid data of known and documented quality. Specific data quality objectives are discussed in terms of accuracy, precision, completeness, representativeness, and comparability.

For this project, accuracy is defined as the ratio, expressed as a percentage, of a measured value to a true or reference value. The analytical component of accuracy will be expressed as percent recovery, based on the analysis of laboratory-prepared spike samples and performance evaluation audit samples. The accuracy of field screening measurements will be measured by routine analysis of field standards and by a comparison of screening data with laboratory results for split samples, as described in Section 2.5 of this QAPP.

Precision for this project is defined as a measure of agreement among individual measurements of laboratory-prepared duplicate samples. Because total method precision will not be determined for this project, no collocated samples will be collected.

Data completeness will be expressed as the percentage of data generated that is considered valid. A completeness goal of 100 percent will be applied to this project; however, if that goal is not met, site decisions may still be made based on the remaining data. No critical samples have been identified for the project.

Representativeness of collected samples is facilitated by establishing and following criteria and procedures identified in this QAPP.

Data comparability is achieved by requiring that all data generated for the project be reported in common units. Table 1 lists the various types of data that will be generated and specific reporting units.

TABLE 1
SPECIFIC DATA REPORTING UNITS

PARAMETER	UNITS
Metals in soil by x-ray fluorescence	Milligrams per kilogram
Metals in soil by laboratory analysis	Milligrams per kilogram (for total concentrations) Micrograms per liter (for Toxicity Characteristic Leaching Procedure data)
Time	Military time (00:01 - 24:00)

1.6 SPECIAL TRAINING REQUIREMENTS AND CERTIFICATION

All site personnel will be required to have completed a basic 40-hour health and safety (Hazardous Waste Operations and Emergency Response) training course and annual refreshers. Familiarization with a XRF instrument and its operating procedures also will be necessary for the Tetra Tech START team.

1.7 DOCUMENTATION AND RECORDS

Tetra Tech START personnel will maintain a field logbook to record all pertinent activities associated with the sampling events. Appropriate documentation pertaining to photographs taken by Tetra Tech START also will be recorded in the field logbook. Video documentation will be performed on all residential areas prior to any excavation and after backfilling is complete. Information pertaining to all samples (such as sampling dates and times, locations, and so on) collected during this event will be recorded on sample field sheets generated by EPA. Labels generated by EPA will be affixed to sample containers, identifying sample numbers, dates collected, and requested analyses. Chain-of-custody (COC) records will be completed and maintained for all samples from the time of their collection until they are submitted to the laboratory for analysis.

A health and safety plan (HASP) will be prepared by Tetra Tech START prior to field activities that will address site-specific hazards. The HASP will be reviewed and signed by all field personnel prior to field work, indicating that they understand the plan and its requirements. Copies of the plan will be available to all personnel throughout sampling activities.

2.0 MEASUREMENT AND DATA ACQUISITION

2.1 SAMPLING PROCESS DESIGN

The sampling design proposed in the following subsections has been selected to fully identify the extent of soil contamination at the site, determine whether removal action goals have been achieved, and determine appropriate disposal options for excavated soils.

2.1.1 Pre-Excavation Screening and Sampling Activities

During the removal action, screening of residential properties for possible lead contamination will continue. The proposed sampling scheme for this project will be judgmental (based on the best professional judgment of the sampling team), in accordance with the Superfund Lead-Contaminated Residential Sites Handbook (EPA 2003). During the screening process, at least four cells will be established across each residential property. These cells will radiate out 100 feet from the drip zone around the home or until the property line is reached, whichever is less. The maximum size of each cell will be 100 feet by 100 feet; however, the actual size will be established in the field based on site features. Additional areas or cells that may be screened include the following: the drip zone; fine-grained material

if used for driveways, sidewalks, or under carports; vegetable gardens; and children's play areas that are at least 25 feet by 25 feet. A composite sample consisting of nine aliquots, each collected from 0 to 2 inches below ground surface (bgs), will be collected in each cell and placed in a labeled, sealed plastic bag.

All samples will be transported to a sample preparation facility and placed in clean, dedicated aluminum pie pans. The samples will be allowed to completely air dry, because the moisture content of a soil sample can adversely affect the accuracy of XRF readings for lead. Once dried, the samples will be homogenized, passed through a number 10 sieve (2-millimeter), and screened for lead using the XRF. Three XRF results will be recorded in the appropriate cell or area on the field sheet for that property. The average of the three readings will also be calculated and recorded on the field sheet. At least 10 percent of the screened soil samples will be submitted to the EPA Region 7 laboratory for confirmation analysis of arsenic, cadmium, lead, and zinc. XRF data are generally considered valid if a comparison between the XRF values and the corresponding laboratory results yields a regression coefficient (r^2) of at least 0.7 (EPA 1994).

2.1.2 Post-Excavation Screening and Sampling Activities

EPA has established a time-critical removal action level of 800 mg/kg for lead in soils at this site. However, this action level will be reduced to 400 mg/kg for school and daycare properties and any primary residence of, or house frequently visited by, a young child (72 months of age or younger) with a documented blood-lead level greater than 10 micrograms per deciliter (µg/dl). At properties meeting the criteria for the 800 mg/kg action level, all screened areas exceeding 400 mg/kg will be excavated if any cell exceeds 800 mg/kg on the property. EPA will conduct removal activities at residential properties only after receipt of written consent from the property owner.

Initial removal activities in each contaminated cell will involve the excavation of approximately 6 inches of soil from the surface layer. This will be conducted with excavating machinery, such as skid loaders, dozers, excavators, backhoes, and hand tools. Tetra Tech START will then collect in-situ XRF readings from the excavated area. If XRF readings are consistently below 400 mg/kg, excavation will be considered complete for that cell. If XRF readings remain above 400 mg/kg, then excavation will continue to a 1-foot depth. If soils exceed 1,200 mg/kg for lead at a depth of 12 inches, excavation may continue until concentrations fall below this level. The EPA may choose to place a warning barrier if the lead concentration in soil below a 24-inch excavation remains at or above 1,200 mg/kg.

After removal of soils from the affected areas, and placement of warning barriers where required, the excavated soils will be replaced with clean backfill. Clean backfill will consist of soils with lead concentrations below 240 mg/kg, and with concentrations of all other hazardous substances, pollutants, or contaminants below residential soil screening levels determined by the EPA, including EPA Region 9 Preliminary Remediation Goals (PRG).

Garden soils that exceed the action level for lead (based on discrete samples) will be excavated to a minimum depth of 24 inches. If soils at a depth of 24 inches exceed 1,200 mg/kg, excavation will continue in 6- to 12-inch lifts until lead concentrations fall below 1,200 mg/kg or until EPA decides to cease excavation and place a warning barrier at the maximum excavated depth.

When the maximum depth of excavation is reached within a cell, Tetra Tech START will collect a nine-aliquot composite sample from the upper 1 inch of soil and screen it for lead with a XRF. Samples from 10 percent of the screened cells will be submitted for laboratory confirmation analysis of lead. If requested by EPA, samples will also be submitted for laboratory confirmation analyses of arsenic, cadmium, and zinc.

Excavated soils will be consolidated on site at a designated repository and/or at a qualified landfill. If requested by EPA, samples of excavated soils will be submitted for toxicity characteristic leaching procedure (TCLP) analysis of arsenic, cadmium, and lead. After completion of all removal activities, the repository will be covered with 1 foot of soil (clay with lead concentrations below 240 mg/kg) and seeded to establish a protective vegetative cover.

To ensure borrow source material (backfill) is non-contaminated, START will collect nine-aliquot samples from 100- by 100-foot cells in potential borrow source areas, where applicable. Once dried, the samples will be homogenized and passed through a number 10 sieve (2-millimeter). Gravel-sized rock will be pulverized using a sledge hammer. The homogenized samples will then be screened for lead using a Niton™ XRF. Three separate XRF readings will be taken from each sample and recorded on the field sheet for the appropriate cell of that borrow source area. The average of these three readings will be calculated and recorded on the appropriate field sheet. All samples will then be submitted for laboratory analyses of barium, cadmium, and lead to confirm that source soils are non-contaminated.

A summary of anticipated samples to be collected for this project is in Table 2. The actual number of samples will depend on field screening results and the amount of soil excavated during the removal action. Removal activities are anticipated to begin in August 2006.

TABLE 2
ANTICIPATED SAMPLE SUMMARY

Matrix	Number of Samples		Laboratory Analyses
	Field Screening	Laboratory	
Soil	1,000	100	Arsenic, cadmium, lead, and zinc
Soil	N/A	10	TCLP arsenic, cadmium, and lead

Notes:

See Section 2.4 for details pertaining to laboratory analyses.

TCLP Toxicity characteristic leaching procedure
N/A Not applicable

2.2 SAMPLING METHODS REQUIREMENTS

Table 3 references EPA Region 7 Standard Operating Procedures (SOP) that will be followed during sample collection. SOPs for sampling surface soil and stockpiled soil are included for activities that may be conducted during the removal action.

TABLE 3
SUMMARY OF SAMPLING METHODS

Matrix	Sample Description	EPA Region 7 SOP Numbers
Soil	On-site surface soil	4231.2012
Soil	Excavated stockpiles	4231.2017

Notes:

EPA U.S. Environmental Protection Agency
SOP Standard Operating Procedure

Tetra Tech START will address disposal of investigation-derived wastes (IDW) and procedures for equipment and personal decontamination in a separate, site-specific health and safety plan. Most IDW will consist of disposable sampling supplies (gloves, paper towels, etc.) that will be disposed of off site as uncontaminated debris.

2.3 SAMPLE HANDLING AND CUSTODY REQUIREMENTS

Sample containers, preservatives, and holding times will comply with procedures defined in Region 7 EPA SOP No. 2420.06D. Chain-of-custody procedures will be maintained as directed by Region 7 EPA SOP No. 2420.04C. Samples will be accepted by the EPA Region 7 laboratory in accordance with Region 7 SOP No. 2420.01D.

Soil samples will be placed in coolers containing packing material and enough ice to ensure that the temperature of the samples does not exceed 4 degrees Celsius (^{o}C). Tetra Tech START will complete necessary paperwork for all samples, including chain-of-custody records, which will accompany the coolers until delivery to the laboratory. If shipment of samples is required by commercial service, each cooler lid will be securely taped shut, and two custody seals will be signed, dated, and placed across the lid opening. Samples will be submitted to the laboratory in a time-efficient manner to ensure that applicable holding times are not exceeded.

2.4 ANALYTICAL METHODS REQUIREMENTS

Samples will be analyzed at the EPA Region 7 laboratory, according to the EPA SOPs listed in Table 4. Detection limits typically reported by those methods are expected to be adequate for this activity. The requested analyses have been selected based on past sampling data and historical information collected for the site.

TABLE 4
ANALYTICAL METHODS

Analytical Parameter	EPA Method or Region 7 SOP Number
SOIL	
Total concentrations – arsenic, cadmium, lead, and zinc	3122.03B
Toxicity Characteristic Leaching Procedure – arsenic, cadmium, and lead	3171.01D

Notes:

EPA U.S. Environmental Protection Agency
SOP Standard Operating Procedure

2.5 QUALITY CONTROL REQUIREMENTS

Because dedicated supplies will be used for all soil samples (plastic bags, sampling gloves, stainless-steel spoons, pie pans, etc.) no quality control (QC) samples will be required to assess potential for cross-contamination. Analytical error (precision and accuracy) will be assessed by the analysis of laboratory-prepared duplicates and spike samples. These criteria, along with other laboratory QC elements, will be performed in accordance with EPA SOPs.

To satisfy QC evaluation criteria for XRF data, Tetra Tech START will compare the screening data with laboratory confirmation results. The mean of three XRF readings taken for each confirmation sample will be compared statistically to the laboratory result for each confirmation sample. For a given XRF instrument, the regression coefficient (r^2) between the XRF data and laboratory confirmation results should exceed 0.7 for the XRF data from that instrument to be considered quantitatively valid (EPA 1994). The XRF instruments also will be checked against known standards each day to assess analytical drift.

For every measurement, the Niton™ XRF has an uncertainty range that represents a 95 percent confidence interval. In general, precision and accuracy increase with increasing sample run time. For samples with very high (greater than 1,000 mg/kg) or very low (less than 300 mg/kg) lead concentrations, the sample run time must be long enough to obtain readings within 30 percent of the actual concentrations. For samples with lead levels between 300 and 1,000 mg/kg, the sample run times should be long enough to obtain measurements within 20 percent of actual concentrations. The soil samples will be screened by the XRF for a minimum of 20 nominal seconds.

2.6 INSTRUMENT, EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE REQUIREMENTS

Tetra Tech START personnel will test, inspect, and maintain all sampling equipment and supplies, along with field screening instrumentation, prior to deployment for field activities. Testing, inspection, and maintenance of analytical instrumentation will be performed in accordance with EPA SOPs and manufacturers' recommendations.

2.7 INSTRUMENT CALIBRATION AND FREQUENCY

Calibration of the field screening and laboratory analytical instrumentation will be in accordance with the referenced SOPs and manufacturers' recommendations.

2.8 INSPECTION AND ACCEPTANCE REQUIREMENTS FOR SUPPLIES AND CONSUMABLES

All sample containers will meet EPA criteria for cleaning procedures required for low-level chemical analysis. Sample containers will have Level II certifications provided by the manufacturer in accordance with pre-cleaning criteria established by EPA in Specifications and Guidelines for Obtaining Contaminant-Free Sample Containers. Certificates of cleanliness will be maintained in the project file.

2.9 DATA ACQUISITION REQUIREMENTS

Tetra Tech START has compiled previous data and information pertaining to the site (including other analytical data, reports, photographs, and maps referenced in this QAPP) from various sources. Some of that data have not been verified; however, that unverified information will not be used for decision-making purposes without verification of its authenticity.

2.10 DATA MANAGEMENT

All laboratory data acquired during this activity will be managed in accordance with EPA Region 7 SOP No. 2410.01D.

3.0 ASSESSMENT AND OVERSIGHT

3.1 ASSESSMENTS AND RESPONSE ACTIONS

Assessment and response actions pertaining to analytical phases of the project are addressed in EPA Region 7 SOPs 2430.05C and 2430.12E. Corrective action will be taken at the discretion of the EPA Project Manager whenever problems appear that could adversely affect data quality or resulting decisions affecting future response actions pertaining to the site.

3.2 REPORTS TO MANAGEMENT

Tetra Tech START will prepare a formal report describing sampling techniques, locations, and problems encountered (with resolutions to those problems); interpretation of analytical results following completion of the field activities described herein; and validation of the laboratory data. The laboratory data for soil samples will be compared to all applicable or relevant and appropriate requirements, including removal action levels established for the site, to determine whether further response is warranted.

4.0 DATA VALIDATION AND USABILITY

4.1 DATA REVIEW, VALIDATION, AND VERIFICATION REQUIREMENTS

Data review and verification will be performed by a qualified laboratory analyst and the laboratory's section manager, in accordance with the laboratory's QA program. The EPA Project Manager will be responsible for overall validation and final approval of the data, in accordance with the projected use of the results.

4.2 VALIDATION AND VERIFICATION METHODS

The data will be validated in accordance with the laboratory's established SOPs. Laboratory personnel will perform QC spot checks, as needed. The EPA Project Manager will inspect the data to provide a final review. The EPA Project Manager will also compare sample descriptions with field sheets for consistency, and will ensure that any anomalies in the data are documented appropriately.

4.3 RECONCILIATION WITH USER REQUIREMENTS

If data quality indicators do not meet the project's requirements as outlined in this QAPP, the data may be discarded and re-sampling or re-analysis may be required.

5.0 REFERENCES

Tetra Tech EM Inc. (Tetra Tech). 2006. Removal Site Evaluation Report for the United Zinc #1 Site. August.

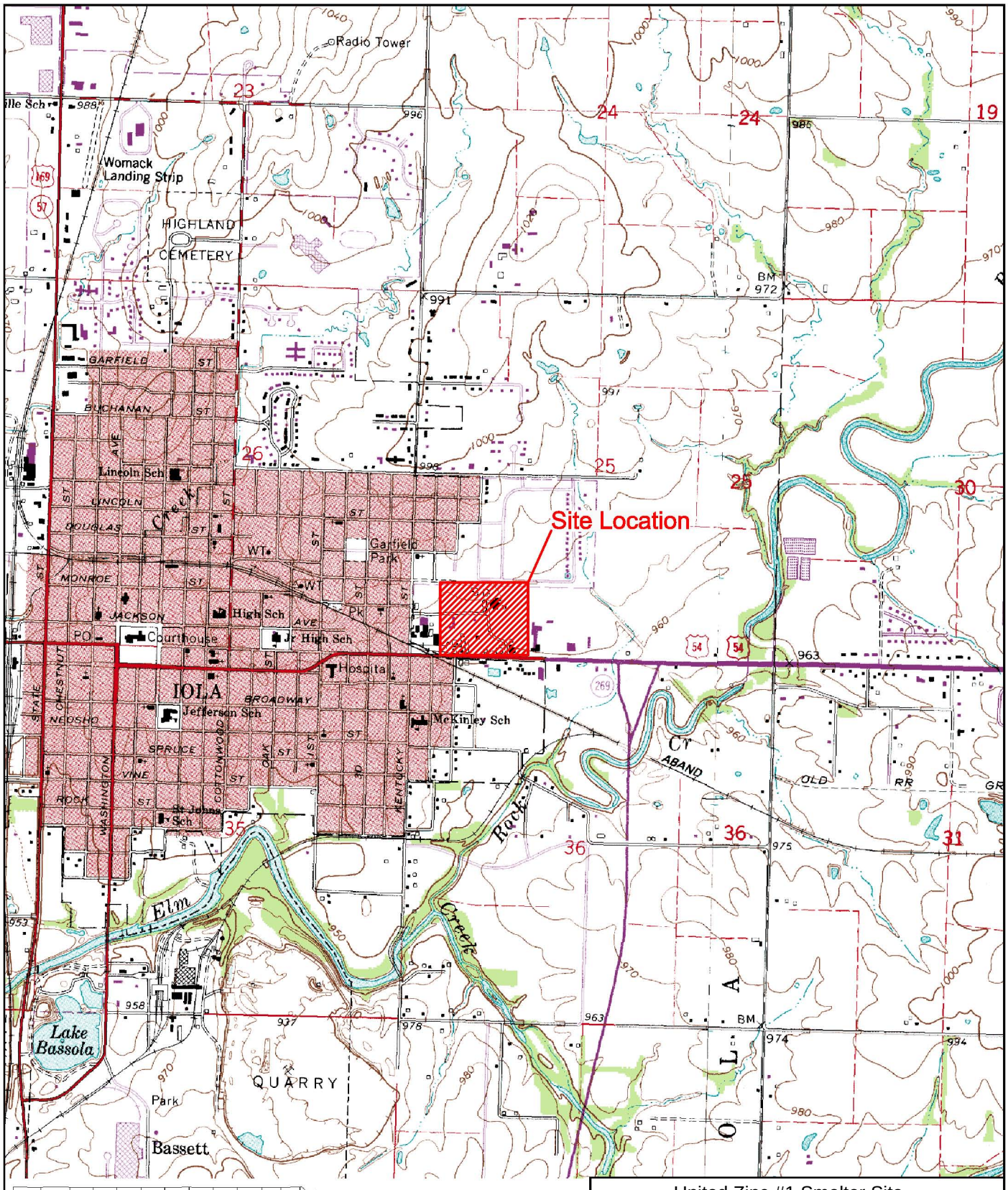
U.S. Environmental Protection Agency (EPA). 1994. Standard Operating Procedure for the Portable XRF Analyzer. ERT No. 4231.1707. December 2.

EPA. 2003. Superfund Lead-Contaminated Residential Sites Handbook. August.

APPENDIX A

SITE LOCATION MAP

(1 Page)



Source: USGS Allen County, KS 7.5 Minute Topo Quad, 1959, PR 1984

United Zinc #1 Smelter Site
Iola, Kansas

Figure 1
Site Location Map

Tetra Tech EM Inc.

Date: 04/5/06 Drawn By: Bill Spiking Project No: I9004.L06.0011.000

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